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Progress Report

The Bovine Brucellosis Eradication Program

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**Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE**

SUMMARY

Substantial gains have been made in the battle to eradicate brucellosis from the nation's beef and dairy herds, particularly during the last 4 years. The statistics used below are reported on the basis of fiscal years (July 1 through June 30).

All 48 States are cooperating in the eradication program under memorandums of agreement with the U. S. Department of Agriculture; most States now have active programs under way; and in all of them individual herd participation in recognized eradication plans is moving forward.

Nearly 63 million cattle were tested during the 4-year period ending June 30, 1958 (fiscal years 1955-58) compared to about 30 million tested during the preceding 4-year period ending June 30, 1954 (fiscal years 1951-54).

Calf vaccinations increased from about 13 million vaccinated during the 4 years ending June 30, 1954, to 21 million during the 4 years ending June 30, 1958.

Cattle showing Brucella infection decreased from 2.6 percent of those blood tested during fiscal 1954 to 1.6 percent of those blood tested during fiscal 1958.

Slaughter of reactors increased from 51.3 percent for fiscal 1954 to 97.7 percent for fiscal 1958.

Number of modified certified brucellosis-free States increased from 3 on June 30, 1954, to 15 States and Puerto Rico by June 30, 1958.

Number of modified certified brucellosis-free counties increased from 334 on June 30, 1954, to 1,216 by June 30, 1958.

Protection from reinfection is provided to States and areas achieving modified certified brucellosis-free status through the announcement of a Federal regulation, effective January 1, 1957, governing the interstate movement of all cattle, except steers, spayed heifers, and calves under 8 months of age.

Alternate plan for recertifying range and semi-range areas was adopted January 3, 1958. This plan provides for screening range herds by blood testing cull and dry cows at ranches, sales yards, and slaughter establishments. Its use is limited to situations in which an effective system has been developed for tracing reactors back to their herds of origin.

Information in this report was provided by the Animal Disease Eradication Division, Agricultural Research Service

PROGRESS REPORT

The Bovine Brucellosis Eradication Program ¹

Steady progress has been made under the national bovine brucellosis eradication program since the fight to eliminate the disease started on a nationwide scale in 1934. Twenty years later the eradication gains had reached the point at which it became apparent that an increased effort could eliminate the disease. The additional funds made available by the Congress, beginning in the fiscal year 1954, have made it possible to certify more areas as modified certified brucellosis-free during the following 4 years (fiscal 1955-58) than had been certified during the entire 20 preceding years.

From July 1, 1954, to June 30, 1958, the number of States achieving modified brucellosis-free status had increased from 3 to 15, and also the Commonwealth of Puerto Rico; the number of counties achieving modified brucellosis-free status had increased from 334 to 1,216; and the level of infection among cattle tested had dropped from 2.6 to 1.6 percent of cattle blood tested.

The program is a Federal-State cooperative effort in which the Animal Disease Eradication Division of the Agricultural Research Service and the 48 State governments and the territories work together in carrying out the eradication measures. Others actively participating in the program, in addition to the individual livestock owners, are practicing veterinarians, Federal-State Extension Services, public health districts, and various livestock and educational groups.

Brucellosis, also known as Bang's disease or contagious abortion, affects cattle, swine, goats, and, to a lesser extent, other animals. It has exacted its heaviest toll from the cattle industry, however. At one time, brucellosis was the most widespread and costly of the communicable diseases affecting cattle in the United States. It still constitutes a serious threat. The contagion can move rapidly from animal to animal, and from herd to herd. The resulting infection causes heavy losses in reduced calf crops and decreased milk production, and in added costs for replacement of diseased animals.

The disease is caused by microorganisms of the Brucella genus from which it derives its name--brucellosis. No known cure had been developed. Calfhood vaccination provides a serviceable degree of immunity.

Brucellosis is communicable to man as undulant or Malta fever. This is primarily an occupational disease, contracted principally by persons handling infected animals.

RECENT STEP-UP IN PROGRAM ACTIVITIES

Participation Increased

Participation in the national brucellosis eradication program has increased steadily since its inception in 1934. All 48 States, Puerto Rico,

¹ Statistical data used in this report were compiled on a fiscal year basis (July 1 through June 30). Thus the 1958 fiscal year (or fiscal 1958) represents the 12 months from July 1, 1957, through June 30, 1958.

Hawaii, Alaska, and the Virgin Islands have signed memorandums of understanding signifying their participation in the program. Most States had active area testing under way by mid-1958, and the rest of them had individual herd participation.

More Cattle and Herds Tested

There has been a significant increase in the number of cattle and herds tested by the blood agglutination test², used to identify individual reactors, and in the number of herds screened by the milk ring test (BRT)³ to determine the probable presence of Brucella infection.

The milk ring test is a relatively new program tool. It was officially adopted in fiscal 1952. The high efficiency of this test in finding suspicious herds has led to its widespread acceptance in a short time.

Since the milk ring test is applied to composite samples of milk from a number of cows it is used most widely in dairy producing States. However, it is now being used to a limited extent in other States as well.

A comparison of activities during the 4-year period ending June 30, 1958 (fiscal years 1955-58), and the previous 4-year period ending June 30, 1954 (fiscal years 1951-54), provides a measure of progress under the program in recent years.

Over 63 million cattle (63,105,272) were blood tested during the 4 fiscal years, 1955-58, as compared to 29,995,142 animals tested during the 4 fiscal years, 1951-54--an increase of 110 percent.

The number of herds tested by the blood agglutination method during the 4 fiscal years, 1955-58, was 4,487,010 as compared to 2,592,444 herds blood tested during the 4 fiscal years, 1951-54--an increase of 73 percent.

There has been an even greater increase in the number of herds given milk ring tests. Over 6 million herds (6,545,433) were milk-ring tested during the 4 fiscal years, 1955-58--an increase of 210 percent over the 2,106,294 herds tested by this method in the preceding 4-year period, 1951-54.⁴

A breakdown of testing activities under the brucellosis eradication program during the recent years is presented in Table 1.

² The blood agglutination test is used to identify individual cattle affected with brucellosis. Under this method of testing, blood samples are taken from individual animals and brought in contact with a test fluid containing Brucella organisms. If the blood sample clumps or "agglutinates" the bacteria in the test fluid at designated levels, it indicates that the animal is affected with brucellosis. Animals reacting in this way to the blood agglutination test are known as brucellosis reactors.

³ The milk ring or Brucella abortus ring test (BRT) is used to screen entire herds and areas to determine the probable presence of Brucella infection. The determination is made by testing composite samples of milk from a number of cows. It is relatively quick and economical. Herds reacting to the milk ring test (BRT) are known as suspicious herds. In such herds, the blood agglutination test is then used to identify individual reactors.

⁴ The periods (1951-54 and 1955-58) are not strictly comparable, since the milk ring test did not become a part of the official program until after the first quarter of fiscal 1952.

Table 1.--Herds and Cattle Tested Under the Brucellosis Eradication Program,
Fiscal Years 1955-58

Tests	Fiscal years				Total
	1955	1956	1957	1958	
<u>Blood Serum</u> <u>Agglutination Test:</u>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Herds tested-----	984,541	1,154,962	1,170,906	1,176,601	4,487,010
Cattle tested-----	14,186,241	16,754,195	15,913,396	16,251,440	63,105,272
<u>Milk Ring Test:</u>					
Herds tested-----	1,200,898	1,727,581	1,866,444	1,750,510	6,545,433

More Calves Vaccinated

The program since fiscal 1954 has also seen a sizable increase in the number of calves officially vaccinated with Strain 19 Brucella vaccine to increase their immunity to brucellosis.

In fiscal 1958 about 6 million calves were vaccinated, or 41 percent of the 15 million calves retained for breeding purposes during the year. In fiscal 1954 approximately 4 million calves were vaccinated, or 26 percent of the 15 million calves retained that year.

The increase in the number and percentage of calves vaccinated, by years, during the 5-year period (fiscal 1954-58) is shown in Figure 1.

Calfhood vaccination was introduced into the national eradication program by the U. S. Department of Agriculture in 1941. It provides a serviceable degree of immunity to Brucella infection, but it also induces in most animals a blood agglutination reaction--usually temporary--which cannot be differentiated from that found in infected animals. Because of this occasional interference with test results, herd owners and sanitary officials in some areas were hesitant about incorporating calfhood vaccination in their testing and slaughter programs. Adoption in 1954 of the new interpretation of the blood agglutination test as applied to officially calfhood vaccinated animals, after research studies had proved its reliability, has encouraged the wider use of calfhood vaccination.

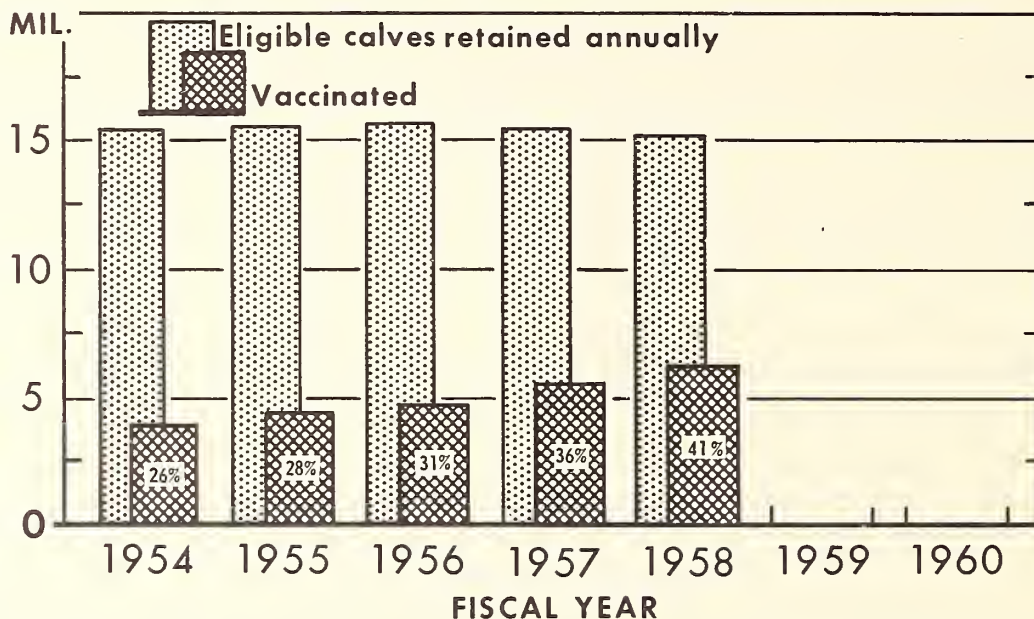
INFECTION REDUCED

The brucellosis eradication effort has resulted in a significant decrease in Brucella infection as measured by the blood agglutination and milk ring tests.

Blood agglutination tests administered in fiscal years 1954-58 show a steady downward trend in Brucella infection from 2.6 percent of the cattle blood tested during fiscal year 1954 and during fiscal year 1955 to 2.2 percent in fiscal 1956, to 1.7 percent in fiscal 1957, and 1.6 percent in fiscal 1958.

The percentage of herds found by blood testing to contain brucellosis reactors has followed a downward pattern similar to that for individual reactors: From 14.2 percent of herds blood tested in fiscal 1954 and 14.6

CALVES VACCINATED AGAINST BRUCELLOSIS



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Figure 1.--The percentage of calves vaccinated as compared to the total retained on farms increased from 26 percent in fiscal 1954 to 41 percent in fiscal 1958.

percent in fiscal 1955 down to 13.5 percent in fiscal 1956; to 10.6 percent in fiscal 1957; and to 9.2 percent in fiscal 1958.

Results of the milk ring testing program provide additional evidence of reduced infection: 26.1 percent of the herds screened in fiscal 1954 were classified as suspicious; 23.2 percent in fiscal 1955; 14.8 percent in fiscal 1956; 11.4 percent in fiscal 1957; and 9.4 percent in fiscal 1958.

The steady decrease in the percentage of herds classified as suspicious on the basis of the milk ring test points up the value of the test. Dairy areas rely mainly on the test for the discovery of infected dairy herds, reserving the blood agglutination test mostly for follow-up testing to identify individual reactors so they can be removed from the herd.

MODIFIED CERTIFIED BRUCELLOSIS-FREE STATES AND AREAS INCREASED

Fifteen States and Puerto Rico had earned the designation of modified certified brucellosis-free by June 30, 1958. Only 3 of these had been certified prior to fiscal 1956.

Modified certified brucellosis-free certification means that not more than 1 percent of the animals or 5 percent of the herds in the area certified had brucellosis at the time of the last test.

The States which have been designated modified brucellosis-free and the date of the certification follows:

<u>State</u>	<u>Date certified</u>
North Carolina - - - - -	July 1, 1942
New Hampshire - - - - -	August 1, 1949
Maine - - - - -	July 1, 1950
Washington - - - - -	June 1, 1956
Wisconsin - - - - -	June 6, 1956
Delaware - - - - -	January 10, 1957
Minnesota - - - - -	May 31, 1957
Connecticut - - - - -	July 26, 1957
Vermont - - - - -	August 12, 1957
Rhode Island - - - - -	February 21, 1958
Pennsylvania - - - - -	March 13, 1958
Utah - - - - -	June 1, 1958
New Jersey - - - - -	June 3, 1958
Michigan - - - - -	June 30, 1958
New Mexico - - - - -	June 30, 1958

The Commonwealth of Puerto Rico also earned certification, effective on November 25, 1957.

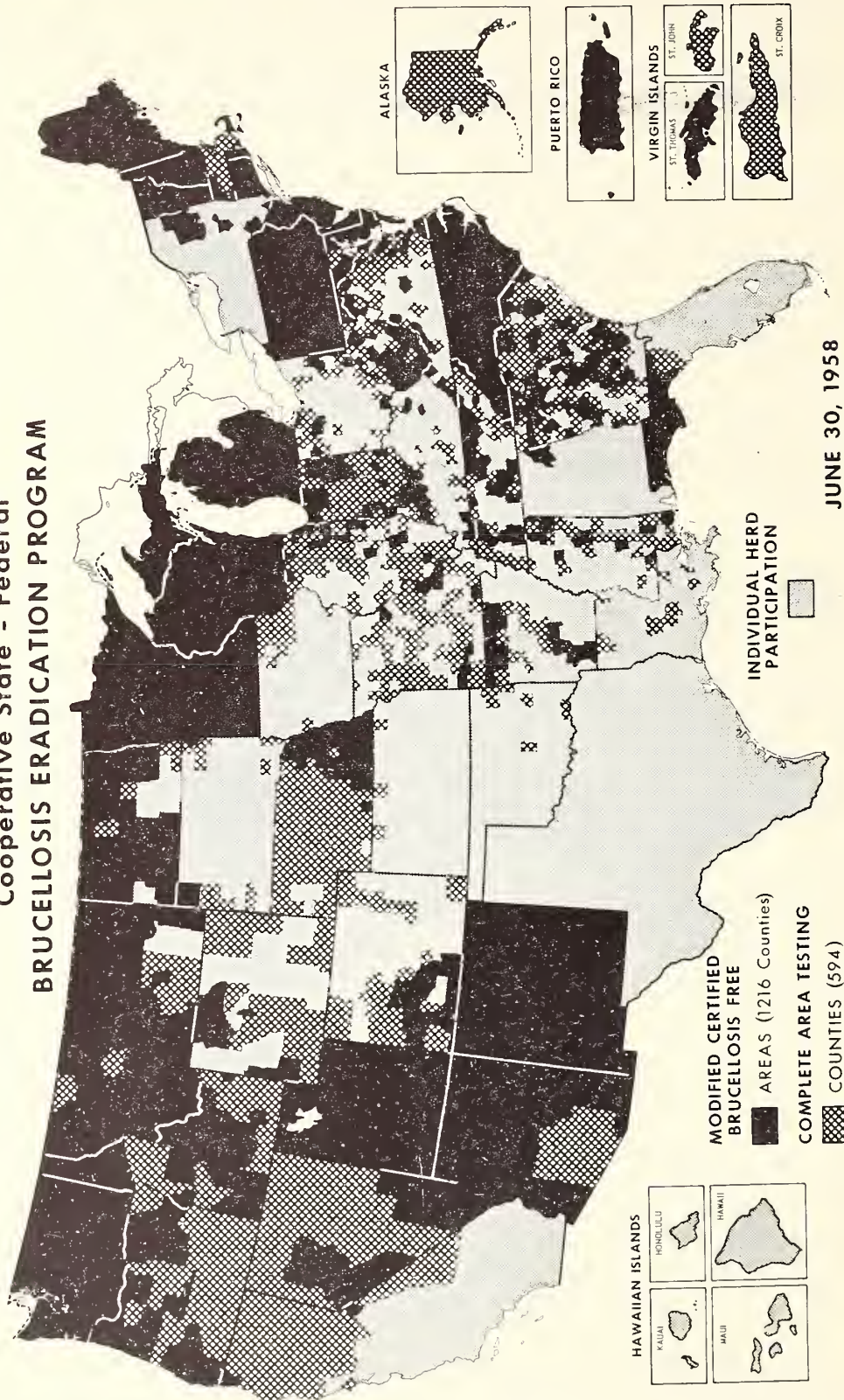
The increased eradication effort has brought about a corresponding rise in the number of counties achieving modified certified brucellosis-free status. On June 30, 1954, a total of 334 counties had this designation. By June 30, 1958, the total of certified counties had reached 1,216, and 594 other counties were doing complete area work leading directly to certification. Thus more than half of the 3,150 counties in the United States, Puerto Rico, and the Virgin Islands are either modified certified or working on an organized area basis toward that goal.

Certification is for 3 years (unless revoked) on the basis of test findings that infection does not exceed 1 percent of the animals in an area and 5 percent of the herds. At the end of the 3-year period, areas certified under any of the 3 approved area testing programs may be recertified without complete retesting if follow-up check testing (according to approved methods) warrants continuance of the modified brucellosis-free rating.

All certification of modified certified brucellosis-free areas is done in accordance with uniform methods and rules adopted by the United States Livestock Sanitary Association (an organization representing all segments of the livestock industry) and approved by the Animal Disease Eradication Division of the Agricultural Research Service. These uniform rules and methods were adopted to insure that maximum confidence can be placed in the certified designation. For the same reason, approved standards for recertifying modified certified brucellosis-free areas after the 3-year period are adhered to under the Federal-State eradication program. In line with this policy it was necessary to remove 8 counties from the certified list in 1957 because of failure to requalify properly within specified time limits.

The modified certified brucellosis-free States and areas as of June 30, 1958, are shown in Figure 2. Also shown are the counties participating in complete area testing programs and areas where participation is on an individual herd basis.

Cooperative State - Federal BRUCELLOSIS ERADICATION PROGRAM



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Figure 2.--Eradication achievements as of June 30, 1958, included 1,216 counties with modified certified brucellosis-free rating and 594 with complete area testing.

MORE REACTORS SLAUGHTERED

A significant development of the brucellosis eradication program during recent years is the growing trend toward slaughtering reactors promptly before they can spread the disease.

During fiscal 1954 only 51.3 percent of the reactors found in testing were slaughtered. This percentage has increased each successive year: to 71.1 percent in fiscal 1955; to 89.2 percent in fiscal 1956; to 95.1 percent in fiscal 1957; and 97.7 percent in fiscal 1958.

Blood testing with immediate slaughter of infected cattle has long been considered the most effective and quickest means of eradicating brucellosis from an area or herd. However, when the infection rate is high, the immediate loss involved in the prompt slaughter of reactors has often been a deterrent to the acceptance of the program by livestock owners acting individually or as participants in an area plan for brucellosis eradication.

Since the early days of the brucellosis eradication program, the Federal government and various States have from time to time made indemnity payments in varying amounts to compensate owners in part for animals destroyed because of brucellosis. In 1954 maximum Federal indemnity payments were increased to \$25 for grade animals and \$50 for purebreds. The payment of Federal indemnities is limited to owners of herds participating in an officially recognized plan calling for the prompt removal of reactors. A majority of the States also make indemnity payments. Federal indemnities are not paid in a State unless they have been authorized by the State livestock sanitary officials.

Three plans (A, B, and C) for the control and eradication of brucellosis from individual herds are officially recognized under the Federal-State cooperative program. Plan A uses the direct test and slaughter approach. The other 2 plans are preliminary measures, designed to reduce infection to a point at which Plan A is economically practicable. All three provide for the use of calfhood vaccination to increase immunity of animals to the disease.

Important provisions of the 3 plans are summarized below:

Plan A calls for testing the entire herd, slaughtering reactors immediately, and cleaning and disinfecting the premises. Vaccination of calves is optional but recommended.

Plan B calls for testing the herd, marking reactors, vaccinating calves, and retaining reactors under quarantine for a reasonably short time until they can be sold for slaughter.

Plan C is principally for range herds in which the infection rate is high and where the movement of animals is governed by special permit from the State sanitary authority. Under this plan calves are vaccinated but the herd is not tested.

As the general level of Brucella infection has been reduced under the eradication program, almost all livestock owners are finding it economically feasible to slaughter reactors immediately rather than hold them for later disposal. Increased use of calfhood vaccination has helped reduce infection to the presently low point.

Local ordinances forbidding the sale, for human consumption, of milk from infected herds also encourage the slaughter of reactors.

Among recent developments contributing to the increased slaughter of reactors are the widespread educational activities and larger indemnities to owners.

The number and percentage of reactors slaughtered during the fiscal years 1954-58 are shown in Figure 3.

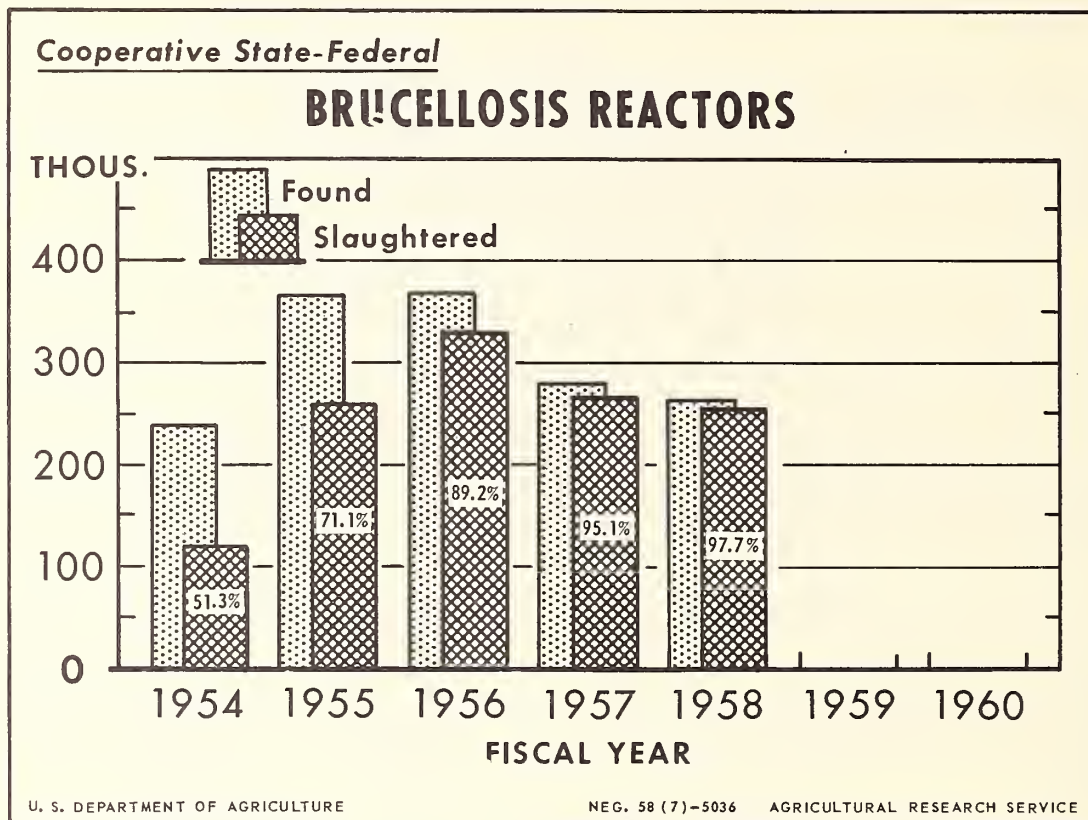


Figure 3.--The percentage of reactors slaughtered rose from 51.3 percent in fiscal 1954 to 97.7 percent in fiscal 1958.

MORE CATTLE UNDER SUPERVISED ERADICATION PLANS

Another development reflecting progress is the steady increase in the percentage of herds and cattle under supervision in 1 of the 3 recognized plans (A, B, C) to control and eradicate brucellosis.

On June 30, 1954, cattle enrolled in a recognized eradication plan totaled 25.7 percent of all cattle and calves on farms. By the end of fiscal 1955, the percentage had increased to 33.1 percent. It stood at 44.0 percent by June 30, 1956, went to 53.4 percent by June 30, 1957, and reached 55.0 percent by June 30, 1958. These percentages include cattle enrolled in individual herd certification plans as well as those under area-wide plans.

Herds participating in official eradication plans require the services of trained veterinarians in order to meet standards for testing, marking and segregating reactors, cleaning and disinfecting, and providing other

safeguards outlined in the national program. Although State and Federal veterinary inspectors provide supervision, the eradication program necessarily depends on practicing veterinarians to provide the bulk of the services.

In order to make additional veterinary service available for the program, the system of paying participating practicing veterinarians was amended to permit payment on a per herd and per head basis. (Formerly payment was on a per diem basis which made it difficult for practicing veterinarians to fit program service into their regular practice.) By June 30, 1958, the number of practicing veterinarians cooperating in the program had increased to approximately 7,000 as compared to 124 in September 1954.

Despite the increase in the number of practicing veterinarians cooperating in the program, inability to meet service requirements fully continues to be an important limiting factor in the brucellosis eradication campaign. More than half the States have indicated that a shortage of veterinarians is restricting the program. Qualified technicians, under effective veterinary supervision, are working in several States and Puerto Rico to help meet this problem.

FEDERAL REGULATION ON INTERSTATE MOVEMENT OF CATTLE

As progress has been made in eradicating brucellosis, the importance of safeguarding these gains has also increased. The potential danger to brucellosis-free herds and areas through the unrestricted movement of infected cattle in commerce is summarized by the statement that brucellosis is a disease that is "bought and paid for."

To combat this danger, many States and areas, over the years, took individual action to protect the eradication gains of livestock owners by regulating the movement of livestock within their borders. However, the problem was complicated by the large number of cattle moving in interstate commerce and the lack of uniform regulations in force among the various States. This lack of uniform regulations sometimes worked a hardship on stockmen shipping their cattle across State lines. Also livestock owners in States which had made eradication progress felt that their herds needed to be safeguarded from infection spread by the interstate movement of cattle from States with less adequate eradication programs.

On July 12, 1956, a new Federal regulation to prevent more effectively the spread of brucellosis from one State to another was adopted. Effective immediately was the provision regulating the interstate movement of brucellosis reactors. Other provisions of the regulation permitting the relatively free movement of healthy cattle across State lines became effective on January 1, 1957.

Interstate movement of all cattle except steers, spayed heifers, and calves under 8 months are governed by the new brucellosis regulation.

The Federal regulation has a two-fold purpose: (1) It protects gains already made in brucellosis eradication by providing additional safeguards for the interstate movement of cattle. These safeguards apply particularly to the movement of cattle from infected herds or areas into brucellosis-free areas. (2) It provides increased incentive to livestock owners to attain and maintain brucellosis-free status for their herds and to cooperate with their

neighbors in plans leading to area certification. Under the Federal regulation, greater freedom of interstate movement is provided for cattle from certified brucellosis-free herds and modified certified brucellosis-free areas than from non-certified herds and areas. Restrictions are placed on the shipment of cattle from infected herds and areas.

The Federal regulation was formulated with suggestions from the States. Among the reasons advanced for a Federal regulation, prior to its adoption, was that establishing Federal standards for the interstate movement of cattle with respect to the brucellosis eradication program would help the States work out more uniformity in their rules. Since adoption of the Federal regulation, a number of States have revised their rules to conform more closely with its provisions. Additional States are expected to take similar action.

The Federal regulation applies only to the interstate movement of cattle. In addition to acquainting themselves with pertinent provisions of the Federal regulation, shippers should consult livestock sanitary officials of the State of destination regarding other requirements, if any, that must be met by the shipment on arrival.

Interested persons may obtain specific details or copies of the regulation from State and Federal livestock sanitary officials in their areas or from the Animal Disease Eradication Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C.

Approval of stockyards and slaughtering establishments.--Under the regulation, the Animal Disease Eradication Division of the Agricultural Research Service is responsible for giving specific approval to stockyards and slaughtering establishments for handling cattle moving in interstate commerce. Approval means that required standards have been met for the safe handling of cattle or their carcasses and products to prevent the spread of brucellosis. Some stockyards and slaughtering establishments are approved only for handling cattle not known to have brucellosis, and others are approved for handling reactors as well.

By June 30, 1958--a year and a half after the Federal regulation fully went into effect--3,116 stockyards and slaughtering establishments had obtained specific approval and were actively participating in the brucellosis eradication campaign. Of these, 1,209 were stockyards--888 approved to handle livestock including reactors and 321 approved to handle cattle not known to be affected by brucellosis. A total of 1,907 slaughtering establishments had received specific approval--446 to handle cattle including reactors, and 1,461 to handle cattle not known to be affected by brucellosis.

As new establishments qualify for specific approval they will be added to the list, while any failing to maintain the necessary safeguards will be removed.

ALTERNATE PLAN FOR RECERTIFYING RANGE AREAS APPROVED

Efforts are continuing to develop and perfect additional tools for implementing the brucellosis program. One needed tool was a simpler method of effectively maintaining range area certification for those areas that had already reached modified certified brucellosis-free status. In these areas, the problem of testing for recertification was complicated by the fact that range cattle wander over wide areas, sometimes mingle with other herds,

and are infrequently rounded up. In recognition of this problem, approval of an alternate plan for recertifying range and semi-range areas on the basis of tests performed on cull and dry cows at ranches, sales yards, and slaughter establishments was announced by the Animal Disease Eradication Division on January 3, 1958.

The primary plan (still generally used for recertifying range and semi-range areas) calls for retesting at least 20 percent of the herds in the area every 3 years. The alternate recertification plan provides for blood testing at least 5 percent of the breeding cows in the area annually, the samples to be taken from cull and dry cows at ranches, sales yards, and slaughter establishments. Both plans provide for more frequent and extensive testing of dairy cattle in range areas.

Use of the alternate recertification procedure is conditioned on development of an effective system for identifying and tracing to herds of origin the cull and dry cows tested at concentration points. This is essential in order to locate and clean up any sources of infection disclosed by the tests.

The alternate plan for recertifying range and semi-range areas was approved after its validity was established through studies conducted on testing cull and dry cows at markets and slaughter points.

Specific provisions of the alternate recertification plan include: Annually vaccinate at least 80 percent of heifer calves retained in the area (except in strictly range areas where winter feeding is not practiced); annually blood test at least 5 percent of the breeding cows in area, the blood samples to be taken from cull and slaughter cows at ranches, sales yards, or slaughtering establishments; blood test herds of origin of reactor cattle; semi-annually screen dairy herds with the milk ring test, blood testing all ring suspicious herds.

Areas are eligible for recertification if the percentage of infection is shown by the tests not to exceed 5 percent of the herds and 1 percent of the cattle population. Recertification is for 3-year periods.

GOOD BASIS FOR FUTURE PROGRESS

The recent gains in the continuing drive to eradicate brucellosis provide a good basis for future progress. However, the task of cleaning up the remaining vestiges of infection involves difficulties that should be realistically and constantly reviewed.

The increase in the number of certified counties to 1,216 brings the goal of country-wide certification closer but at the same time increases the urgency for protecting gains already made through constant vigilance and determined efforts to eliminate pockets of infection. Vaccination provides one important means of protection.

The livestock industry faces the problems of carrying forward the eradication drive with many assets. Important among these is a rather general acceptance of the fact that brucellosis is dangerous and costly--that it is cheaper to eradicate the disease than to try to live with it. Also the success that more than one-third of the counties of the United States have had in achieving and maintaining modified certified brucellosis-free status with the knowledge and tools now available is encouraging evidence that the remaining counties can also achieve certification. During the month of June 1958 alone, 81 new counties were added to the modified certified brucellosis-free list.

The outlook for the future is that activities and accomplishments under the brucellosis eradication program will continue at their present high level. Precise forecasting of long-range prospects for eradication progress is difficult because of the many variables involved. However, accomplishments to date appear to justify hopes that steady progress can continue toward achieving the final goal--eradication.